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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/742,366 | 12/22/2000 | Reza-ur Rahman Khan | 1875.0200000 | 8152 |

7590 07/17/2002
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Washington, DC 20005-3934

EXAMINER

PAREKH, NITIN

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2811

DATE MAILED: 07/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicant(s)

09/742,366

Applicant(s)

KHAN ET AL.

Examiner

Nitin Parekh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14, 18-22, 40, 43-46, 60 and 63-79 is/are pending in the application.
- 4a) Of the above claim(s) 40 and 43-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14, 18-22, 60 and 63-79 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) Z.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 14, 18-22, 60 and 63-79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Higgins, III (US Pat. 5583377) in view of Karnezos (US Pat. 6020637) and Higgins III (US Pat. 5291062).

Regarding claims 14, 22 and 60, Higgins III discloses a ball grid (BGA) package comprising:

- a conventional substrate such as FR4/epoxy/organic, flexible/tape, etc. (12 in Fig. 1; Col. 3, line 45) having a first and second surface
- a heat sink/stiffener (22 in Fig. 1) having a first and second surface, where the second surface is attached to the first substrate surface
- an integrated circuit (IC) die being mounted on the first heat sink/stiffener surface (13 in Fig. 1)
- a plurality of solder balls (21 in Fig. 1) attached to the second substrate surface

- the substrate having a window opening (20 in Fig. 1) that exposes a portion of the second stiffener/heat sink surface, and
- the exposed portion of the second stiffener/heat sink surface is configured to be coupled to a substrate (34 in Fig. 1)

(Fig. 1; Col. 3 and 4).

Higgins, III discloses coupling the stiffener/heat sink to a user substrate but fails to specify the user substrate being a printed circuit board (PCB).

It is conventional in chip packaging art to use a variety of mounting substrates such as PCB, motherboard, etc. Higgins III ('062 patent) teaches using conventional board/PCB as a mounting substrate for a BGA package (Col. 4, line 25-30).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate coupling of the BGA to a PCB using Higgins III ('062 patent)'s substrate in Higgins, III's package.

Regarding claims 18 and 19, Higgins, III further discloses the stiffener/heat sink having:

- a centrally located cavity/cavity-shaped portion that protrudes through the window opening (Fig. 1) wherein the surface of the cavity portion is a portion of the exposed portion of the second stiffener/heat sink surface
- the IC die being mounted in the cavity portion, and

- the surface of the cavity portion being bonded/plated with a solder/metal (36 in Fig. 1) that allows the stiffener/heat sink to be mounted to a soldering pad (35 in Fig. 1; Col. 4) on the substrate/PCB.

Regarding claim 20, Higgins, III further discloses the wire bond coupling of the IC die to the substrate and stiffener/heat sink being electrically coupled to a ground//first potential/voltage/plane to achieve the desired grounding/voltage connection in addition to the thermal dissipation (Col. 4, line 50; Col. 9, line 1-10).

Regarding claim 21, as explained above for claim 20, Higgins, III discloses electrically coupling the stiffener/heat sink to the desired ground//voltage connection but fails to specify coupling a ground pad of the IC die to the first surface of the stiffener/heat sink using a wire bond.

Karnazos teaches using conventional coupling of an IC having a plurality of bonding wires/die pads where a bonding wire corresponding to a ground ring connection on the first surface of the stiffener/heat sink is coupled to a respective die pad/ground pad (26"/21 in Fig. 2; Col. 2, line 30-40) while additional wire bonds (26' in Fig. 2) can be used to provide the desired signal/power connections for the corresponding die pads to the substrate.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate coupling a ground pad of the IC die to the

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first surface of the stiffener/heat sink using a wire bond so that the power/ground routing and thermal dissipation can be improved using Karnezos and Higgins, III ('062)'s wiring design in Higgins, III's package.

Regarding claims 63-79, the claim elements have been addressed in the rejections as explained above for claims 14 and 18-22.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number is 703-305-3410. The examiner can normally be reached on 09:00AM-05:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3431.

Nitin Parekh

NP
07-07-02

Steven Loke
Primary Examiner

